



Thursday, February 25th
3:00 PM Bowen Hall Rm 222

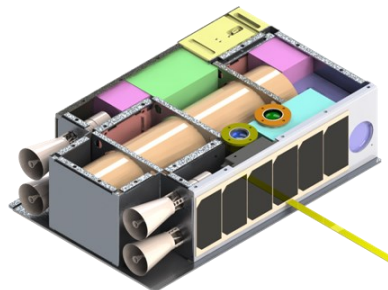
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Weather Sensing and Laser Communications for Nanosatellites

Researchers, commercial industries, and defense agencies all want more observations of Earth, more frequently, at higher resolution, for more wavelengths, and to get these data down to the ground as quickly as possible. CubeSats, with their relative ease of access to space, have the potential to meet these geospatial, temporal, and spectral demands. We discuss two gaps: (1) We need compact, power-efficient, and well-calibrated scientific instruments for CubeSats to benefit from this opportunity, and (2) we need fast, frequent, secure, efficient and reliable communication to obtain the desired data. For applications such as weather sensing, resource monitoring, and surveillance, measurement quality depends on the ability of the platform to maintain attitude, accurately point to a specific target, and maintain calibration. Even more precise pointing is required for laser communication links. We present advances toward closing gap (1) with a new approach to cross-calibrate CubeSat weather sensors, a microwave radiometer and GPS radio occultation receiver, and closing gap (2) with a nanosatellite laser communication module that augments CubeSat body-pointing with a MEMS fast steering mirror. With continued improvements in science quality, data transfer, and attitude determination and control, CubeSats can contribute valuable observations of Earth's oceans, surface, atmosphere, and ionosphere.

Kerri Cahoy, Boeing Assistant Professor of Aeronautics and Astronautics at MIT, received her B.S. (2000) in Electrical Engineering from Cornell University, and M.S. (2002) and Ph.D. (2008) in Electrical Engineering from Stanford University working with the Mars Global Surveyor Radio Science Team. From 2006-2008, she was a Senior Payload Engineer at Space Systems Loral. From 2008-2010 she was a NASA Postdoctoral fellow at NASA Ames. From 2010-2011, she was a research scientist on GRAIL (Gravity Recovery and Interior Laboratory) at NASA Goddard. Cahoy received a 2013 AFOSR Young Investigator grant to investigate sensitivity of communication satellite components to space weather and a NASA New Investigator Program in Earth Science grant in 2014 to enable atmospheric data retrieval from nanosatellite sensors.



MIT KitCube, 6U CubeSat to demonstrate lasercom, green monopropellant propulsion systems, and 10 arcsec pointing from orbit around the Moon.

For inquiries, please contact the Dept. of Mechanical & Aerospace Engineering at 609-258-0315

ALL VISITORS ARE WELCOME!